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EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 09/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/595,075

Applicant(s)

KWEON ET AL.

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3 and 9-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12-14 is/are allowed.
- 6) ☒ Claim(s) 1,3 and 9-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 7/31/03. Applicant's arguments have been considered, but are not persuasive. Claims 1, 3 and 9-14 are pending. Claims 2 and 4-8 have been canceled.

#### ***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/31/03 has been entered.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3 and 9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 has been amended to state "the metal oxide on the surface of the compound

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excludes Li”, which is not supported by the original specification. Any negative limitation or exclusionary proviso must have basis in the original disclosure. Any claim containing a negative limitation which does not have basis in the original disclosure should be rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement. See MPEP 2173.05(j).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Li, WO 97/49136.

Li teaches a lithium ion battery having a positive electrode material including a lithiated metal oxide core coated with a lithium ion conductor. The core material is preferably a lithiated transition mixed-metal oxide wherein the transition metals are selected from cobalt, nickel, vanadium, titanium and mixtures thereof. The coating material is preferably an alkali metal-metal oxide wherein the metal are selected from cobalt, vanadium, titanium, aluminum, boron and mixtures thereof. See page 6, lines 1-22. Note lithium and sodium (Na) are both alkali metals. Li teaches that aluminum may be contained in the core material and the coating material (page 7, lines 3-4). Coating may broadly be construed as a physical treatment such as the application of a shell encapsulating the core and/or a surface treatment (page 11, lines 10-12). Elemental aluminum and/or boron may additionally be added to the core (lithium nickel cobalt

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oxide) to improve the properties thereof (page 12, lines 15-19). The coating thickness may range from very thin at the monomolecular level, up to the micron level (page 13, lines 21-23). A thickness of 10 nm is taught on page 14, lines 6-7. See also page 15, lines 9-12 regarding the coating process.

Thus the claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishida et al., JP 08-236114 (see attached machine translation of document) in view of Miyasaka, US 6,037,095.

Nishida teaches a lithium secondary battery having a positive electrode active material of a lithium transition metal multiple oxide which is coated with a metal oxide such as MgO, CaO or aluminum oxide. See page 1, paragraph [0006]. The lithium transition metal oxide may preferably be a lithium nickel cobalt oxide (page 1, [0007]). The thickness of the coating is controlled by the method of applying the coating (page 2, [0018]).

Nishida does not explicitly teach the positive active material compound of claim 1 or the positive active material compound of claim 10.

However, Miyasaka teaches a lithium secondary battery having a positive electrode material of the formula  $\text{Li}_x\text{Ni}_{1-y}\text{Co}_{y-k}\text{M}_k\text{O}_{2-z}\text{X}_a$  where M may be Al, Mg or Ti, X is a halogen

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atom, and “x”, “y”, “k”, “z” and “a” satisfy the requirements shown in col. 4, lines 26-40. See col. 6, for examples of the positive active materials disclosed by Miyasaka. Preferred examples of positive active materials are:

$\text{LiNi}_{0.7}\text{Co}_{0.28}\text{Mg}_{0.02}\text{O}_2$ ,  $\text{LiNi}_{0.7}\text{Co}_{0.26}\text{Al}_{0.04}\text{O}_2$  and  $\text{LiNi}_{0.7}\text{Co}_{0.25}\text{Ti}_{0.05}\text{O}_2$  (teaches compound of claim 1); and

$\text{Li}_{1.03}\text{Ni}_{0.67}\text{Co}_{0.26}\text{Al}_{0.04}\text{O}_{1.9}\text{F}_{0.02}$  (teaches compound of claim 10).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Nishida teaches that the metal oxide coating may be applied to various lithium transition metal oxide materials of lithium secondary batteries (page 3, [0029]). One of skill would be motivated to coat the surface of the positive active material of Miyasaka with the metal oxide coating of Nishida because the charge/discharge cycle properties of the lithium secondary battery would be enhanced (see page 1, [0001] and Table 1). In view of the teachings of Nishida, one of skill would have been motivated to coat any known positive active material compound for a lithium secondary battery with the metal oxide of Nishida.

Regarding claims 3 and 11, one of skill would have been motivated to vary the thickness of the coating layer because Nishida teaches the thickness of the coating is controlled by the method of applying the coating. Nishida teaches and suggests that the thickness of the coating is dependent upon the duration of time for applying the coating (page 2, [0018]). Thus, one of skill in the art would have been known that a desired thickness of the coating layer could be achieved by using the appropriate coating method and duration time.

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Regarding claim 9, the courts have ruled that product-by-process limitations, in the absence of unexpected results are obvious. Thus, whether the coating is applied by a dip method, chemical vapor disposition, sputtering or any other method of applying the coating is used, the coated positive active material, as an end result, is the same. See MPEP § 2113.

***Allowable Subject Matter***

Claims 12-14 are allowed.

The prior art does not teach or suggest the positive active material of claim 12 coated with a metal oxide.

***Response to Arguments***

Applicant's arguments filed 7/31/03 have been fully considered but they are not persuasive.

Li (WO97/49136)

Applicant argues claim 1 is not anticipated by Li for at least the reason that Li does not teach or suggest a metal oxide coating excluding lithium (note this limitation is rejected as containing new matter). However, Li teaches an alkali metal-metal oxide or an alkali metal-mixed oxide. Alkali metals are lithium, sodium, potassium, rubidium, cesium and francium (Group 1A of the Periodic Table of the Elements). Note that sodium is one of the metals for the metal oxide coating of pending claim 1.

Kweon (US6,372,385)

The rejection of claims 1, 3 and 9 under 35 U.S.C. 102(e) as being anticipated by Kweon et al., US 6,372,385 has been withdrawn. Kweon is no longer available as prior art against the claimed invention.

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Nishida et al. in view of Miyasaka

Applicant argues Miyasaka does not teach or suggest a metal oxide coating for the positive active material. However, Nishida teaches that the metal oxide coating may be applied to various lithium transition metal oxide materials of lithium secondary batteries (page 3, [0029]) and that coating positive active materials of lithium-transition metal composite oxides with a metal oxide enhances the charge/discharge cycle properties of a lithium secondary battery containing the metal oxide coated active material. One of skill in the art would have known that coating the active material of Miyasaka with a metal oxide (taught by Nishida) would have resulted in enhanced charge/discharge cycle properties of the lithium secondary battery.

The Examiner would like to point out the positive active material compounds of claims 1 and 10 are not inventive (taught by Miyasaka). Furthermore, the metal oxide coating of claims 1 and 10 for coating a positive active material is not inventive (taught by Nishida). Nishida teaches a lithium secondary battery having a positive electrode active material of a lithium transition metal multiple oxide which is coated with a metal oxide such as MgO, CaO or aluminum oxide. The lithium transition metal oxide may be a lithium nickel cobalt oxide. It is known in the art to coat lithium transition metal oxides with metal oxide coatings. Thus, it is not considered inventive to coat a known positive active material with a known metal oxide coating. One of skill would have found it obvious to coat any known lithium transition metal oxide with the metal oxide coating of Nishida in view of the teachings of the prior art. Nishida teaches the metal oxide coating may be applied to various lithium transition metal oxide materials of lithium secondary batteries (page 3, [0029]).



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Miyasaka in view of Kweon

The rejection of claims 10 and 11 under 35 U.S.C. 103(a) as being unpatentable over Miyasaka, US 6,037,095 in view of Kweon, US 6,372,385 has been withdrawn.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Amatucci et al. 5,705,291 teaches coating a positive active material lithiated intercalation compound with boron oxide or aluminum oxide (col. 2, lines 5-29).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at (703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).



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September 5, 2003